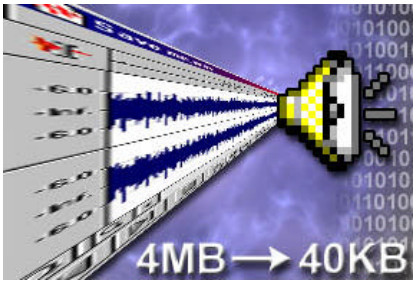
Navy Topic No: N96-254



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chaotic.com® has been in business since 1985 developing software and systems to detect, characterize, analyze, predict, and control signals in harsh, nonideal environments. Applications include; optimum detection of weak signals, mitigation of multi-path (reverberation) effects, virtual sensors, motion prediction, and system fault detection.

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SBIR Investment: $817K

Non-SBIR Investment: $150K

Stochastic-Image Compression

About the Technology

The Navy has a critical need to move large image-like files, such as lofagrams (acoustic spectrograms), over capacity-limited communications channels. These images typically have a random-like (stochastic) nature that renders them impossible to compress with conventional techniques. Under this SBIR, chaotic.com® developed algorithms that compress lofargram files to a 4.1:1 ratio. This is achieved by separating the high-entropy features into sub-planes where the features and artifacts in each plane are represented by statistically correlated parameters. These derived "parameter matrices" can then be optimally compressed at the sending site using a variety of techniques. At the receiving site the image is reconstructed using Monte Carlo simulations to recover the local feature statistics. The critical notion is that the features needed for detection are preserved. To the expert observer, the original and decompressed image appears to be identical.

Benefits to SPAWAR and other DOD Programs

Transmitting large image-like files over communications channels requires high- bandwidth capabilities along with the associated hardware. By compressing these types of files with near-real-time reconstruction at the receiving site, existing communications systems can transmit more images. This technology has wide reaching implications as it can be used to transmit large random-like ("noisy") files that cannot be compressed with other methods.

Why Stochastic-Image Compression Improves Technology

- Enables timely dissemination of critical, tactical products needed by the Fleet.
- Allows distributed analysis and multi-sensor correlation.
- Potential to transmit higher quality images.

Military and Commercial Significance

- Cost-effective alternative to increasing communication bandwidth.
- Can be easily adapted to surface, air, and submarine platforms for radar and other imaging systems. These techniques are especially applicable for uninhabited air vehicle (UAV) imaging systems where weight and power are constrained.
- Also applicable to battlefield medicine (such as X-ray images) and fingerprints (for rapid identification).
- Chaotic has received a $150K Phase III award to modify and test the SIC algorithms for the Surveillance Towed Array Sensor (SURTASS) system, which is an antisubmarine warfare surveillance system.